

Male Combat in Copperheads (*Agkistrodon contortrix*) from Northern Virginia

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Male combat in snakes refers to ritualized behavioral interactions between males, usually during the mating season (Carpenter & Ferguson, 1977). The behavior has been recorded in numerous species of boiids, colubrids, elapids, and viperids worldwide (Carpenter, 1986). The objective of the behavior is to determine which of the snakes is the dominant male, with the winner of the combat usually mating with a nearby female. Such domineering behavior is correlated with sexual size dimorphism; if males are the larger sex, then large size is advantageous during behavioral competition with other males (Shine, 1978). Schuett & Gillingham (1989) found in laboratory experiments that larger male copperheads were successful in defending mates during courtship and that larger males were winners in 11 of 13 trials involving male-male interactions.

Observations of male combat in northern copperheads (*Agkistrodon contortrix mokasen*) in nature are rare. J. Ackroyd (in Gloyd, 1947) witnessed male combat in this species in late June 1945 in Frederick County, Virginia (his observations are repeated in Mitchell, in press). Mitchell (1981) reported a putative instance of male combat based on the discovery of two large males in the City of Richmond on 3 August 1980 that had been entwined when killed by a resident. In this note, we report a confirmed instance of male combat in *A.*

contortrix in Virginia and explore the timing of this behavior.

At 1330 hr EDT on 23 August 1992 the senior author discovered two large (1-1.3 m) northern copperheads on a hill above Carter Run in a heavily forested property near County Route 691, ca. 10 km NW of Warrenton, Fauquier County, Virginia. The snakes were behind a woodshed on a low pile of metal roofing, old fence posts, and various pieces of lumber. The large males were entwined and lying outstretched on top of one of the pieces of metal roofing. The snakes struggled together for 5-10 minutes, each attempting to achieve the superior, as well as anterior, position. As the snakes moved forward and upward, they would occasionally slide backward on the metal; the roofing was slightly inclined toward the rear of the snakes. SHS moved to within 3 meters to photograph the snakes, who became alarmed and then disentangled. One snake took cover under the piece of metal roofing and the other made its way to a nearby pushed-over stump and disappeared down a hole at its base.

A close inspection of the immediate vicinity revealed a third, smaller copperhead (about 2.5 ft) coiled on top of an old, leaf litter-covered piece of plywood 2-3 meters from the main pile of materials. This snake was probably a female.

In his eleven-year study of copperheads in Kansas, Fitch (1960) concluded that male combat occurred only rarely or at night, and even then the snakes were secretive. Ackroyd's observations (in Gloyd, 1947) took place at 2230 h. Thus, the observation reported above demonstrates that this behavior may occur in Virginia copperheads during the day, as well as at night.

Our observation of male combat in August helps confirm that this behavior and at least some mating events take place in Virginia *Agkistrodon contortrix* in late summer. W. H. Martin III (pers. comm.) observed male combat in Albemarle County on 5 September 1976, providing further substantiation. Wood (1954) thought that male combat in this species "takes place in spring." The laboratory-based observations on mating and male combat made by Schuett & Gillingham (1989) occurred in two periods, February-April and August-October. The accumulated field observations of mating in copperheads fall in two periods, April-May and September-October (Ernst, 1992). Mating has been observed in Virginia in April and May (Mitchell, in press) and in September (W. H. Martin, III, pers. comm.). It follows that male combat behavior in copperheads should occur during the spring mating period, as well as in the late-summer to fall mating period, as observed above. Obviously, observations of male combat in spring are needed to confirm its occurrence in both of these seasons in Virginia.

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